FRESH WATER LITERACIES: A PRACTITIONER INQUIRY APPROACH TO DEVELOPING A CURRICULUM FOR THE ANTHROPOCENE

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THE STUDY

- Develop an interdisciplinary framework for constructing curriculum in METALS (Mathematics, Environment, Technology, Arts, Language and Science) as a relevant variation to STEM/STEAM in primary schools.
- The innovation/provocation is around developing a primary Curriculum for the Anthropocene (the current era in earth's history) Its about living within ecologies not outside- which is a challenge for us all
- Practitioner Inquiry model of professional learning- small projects- high impact- co researching team of academics and classroom teachers. (Kemmis & McTaggart 2008; Goodyear, Casey & Kirk 2017, Gewirtz et 2015)

University of South Australia

CONTEXT

- Team teaching Year 5 teachers in three schools two on River Murray one on urban Wetland
- Project team 3 elders, 3ECRs, Partners, Urban Ecologists, NRM education. DECD, artist,
- pilot study

Why water? Why Not?

- South Australia Murray in trouble- connecting children to natural world- looking after river
- *Access to fresh water is a basic human need we live*
- More people die of water borne disease than war, HIVaids and traffic accidents together,
- Every 8 secs a child dies from dirty water Maude Marlow 2014
- Transdisciplinary connected learning (STEM/ METALS)

INFLUENCES

- Literacies in Place" (Comber, Nixon and Reid 2007) place consciousness Sommerville 2013 **water** as a source of personal and cultural meaning
- Indigenous knowledges critical connection to place intense consciousness of place notion of contact zone (Rigney & Hemming 2013)
- Connecting children to natural world (Louv, 2008, Suzuki, 2010)

- Dramatic change in our world view as suggested by Laszlo (2014, 67)
- "massive collapse of biodiversity and the ecological destruction we are currently witnessing-an extraordinary crime against a truly wondrous creation" (Murphy 2014, 78) Rockstrom's planetary boundaries

- For humans to thrive in the future, we will need to systematically rethink education, helping students learn the knowledge that is most useful for their survival on a planet that is undergoing rapid ecological changes (Assadourian (2017, 3) But message of hope

- Anticipatory Critical Praxis Pedagogy **(**Hodson, 2003,2014; Moore & Reid, 1992) action orientated, futures thinking (Lloyd & Wallace, 2004), slow eco pedagogy (Payne 2015)

OUR RESEARCH QUESTIONS

- What would a Curriculum for the Anthropocene look like?
- What impact does action research as pedagogy have on the development of curriculum, local community knowledge and resources and contextually responsive approaches?

OUTLINE OF PROGRAM

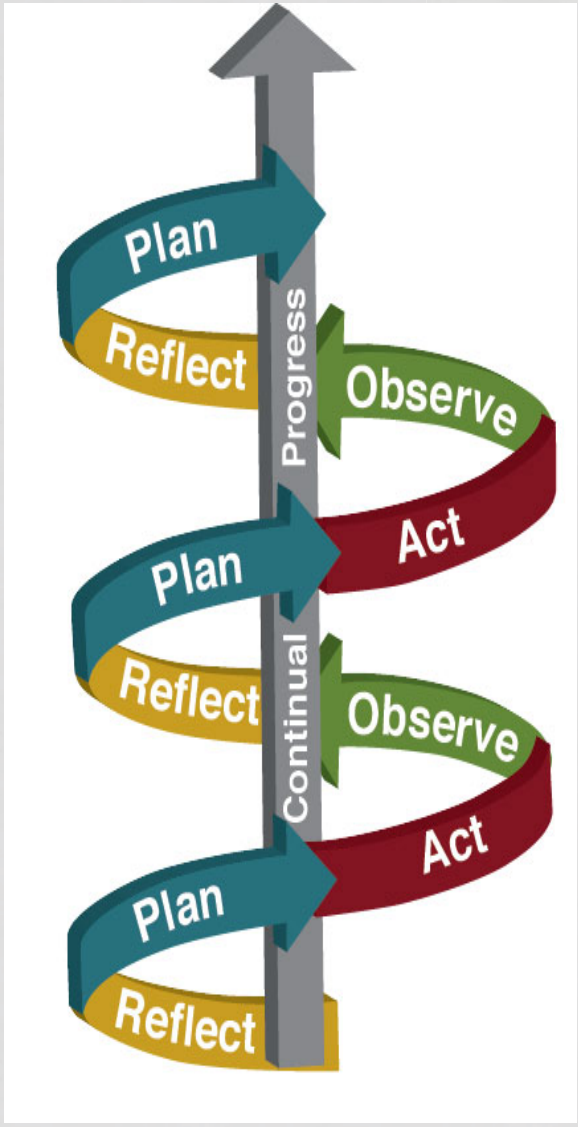
Structure	Time	Tasks/foci
Provocation	Term 4 2016 Day 1	Negotiating the curriculum, Indigenous content, Art of Water. **critical praxis model**, Journals, Water Literacy in the Anthropocene, NRM education, **thinking about essential questions,** aspect of place based pedagogies, **action research**.
Provocation	Term 1 2017 Day 2 & 3	Sharing artefact, connection to water, Citizen science, Observational drawing techniques, River literacies input and inspiration, Australian Curriculum- Science maths **Planning transdisciplinary unit, develop research question**
Implementation	Term 2 2017 Day 4	Implement in classroom/school/community (sharing outcomes today) visualizing desirable futures; understanding the problem and being part of the solution, Sunship earth, **Conversations between academics and year 5 teachers Practitioner Inquiry,**
Evaluation/	Term 3/4 Day 5 & 6	Visit Goolwa and Burton, Futures visioning, What is STEM? **Celebration of students work, EXPO**, activist pedagogy, **Presentation** at state based conference. **Reflection on** Innovative practices documented,

Team	artefact
Professor Barbara Comber (Literacy)	photograph
Professor Margaret Sommerville (Place conscious perspective)	
Dr Kathryn Paige (Science, mathematics eco justice)	Watering can
Dr David Caldwell (literacy),	Water test kits swimming pool
Dr Sam Osborne (Indigenous perspectives).	Spinifex resin
Dr David Lloyd, Futures, Bees Dr Lisa O'Keeffe, Mathematics	Magpie umbrella
Katrina Elliott DECD Science and maths project officer PhD student	
Rob Wallace Hugh Kneebone NRM Board	
Dr Philip Roetman, Citizen science John Whitney- artist	

Action research is a deliberate, solution-oriented investigation, characterised by <u>spiraling cycles</u> of:

1. **problem identification**
2. **data collection**
3. **analysis**
4. **reflection**
5. **action**
6. **Redefinition**

It is a process that continues throughout your career. Even as you report results and reflect on the process, you will continue to evaluate and improve upon



Adapted from: McMillan, J. H. & Wergin. J. F. (1998). *Understanding and Evaluating Educational Research*.

INQUIRY FOCUS

School	Initial question	Final question	Celebration
B1	**How does enhanced connection to local place impact on thinking, feeling & intention to living sustainably within natural environments?** **How does communicating science impact on visualising futures?**	How can we change the curriculum and children's learning from passive participation to active participation in the management of the lake systems? How can I create a connection to the lake for my class?	EXPO Fundmycommunity Letters to council Letters to MP
B2	**How does investing in scientific literacies impact on desirable futures for our local wetlands?**	What works to develop students as activists for the local environment wetlands?	Expo in hall– 90 parents/grand BBQ letters
G1	**Focus is on the virus and impact of that, the clean up of the river, and other fish affected, impact on**		

Water Literacies – What a Bonney Beautiful Spot!

Environmental art Project reinvigorating outdoor classroom

PROGRAM OF WORK

Lake B is one of the main resources of the …region. It holds much recreational, economical and culture importance to the people and industries of the region.

By the end of this unit, students will have researched the impact of different influences on the lake and surrounding areas and provided detailed plans for the management of Lake Bonney and the surrounding areas.

Focus	LI	Lesson description	SC	Observations
Prior Knowledge	Identify what we know about the lake Sort our ideas about the lake into categories	Recreational, cultural, environmental		
Recreational	Understand how the lake is used recreationally Understand and identify the impacts of these activities both positive and negative Identify keay moments in the History of Lake Bonney Capture images of the lake aesthetically	Sketch the lake. What do you see? Look at the different recreational activities the lake has to offer. Sketch/record different recreational activities What would the lake look like without these activities? How does this impact the lake? Positive/Negative/Neutral Grassed area at Yacht Club through to ANZAC Memorial	List recreational activities Justify impact of recreational activity as positive, negative or both. Recall key moments in history Rule of thirds	Hunta- discovery of historical signs. Made it his purpose to read and share every one. Glenys-Walking historical document (Last 60 years of the development of the lake) Children had a huge discussion of their own use of the lake Shared understanding and connection to the lake Beginnings of artwork

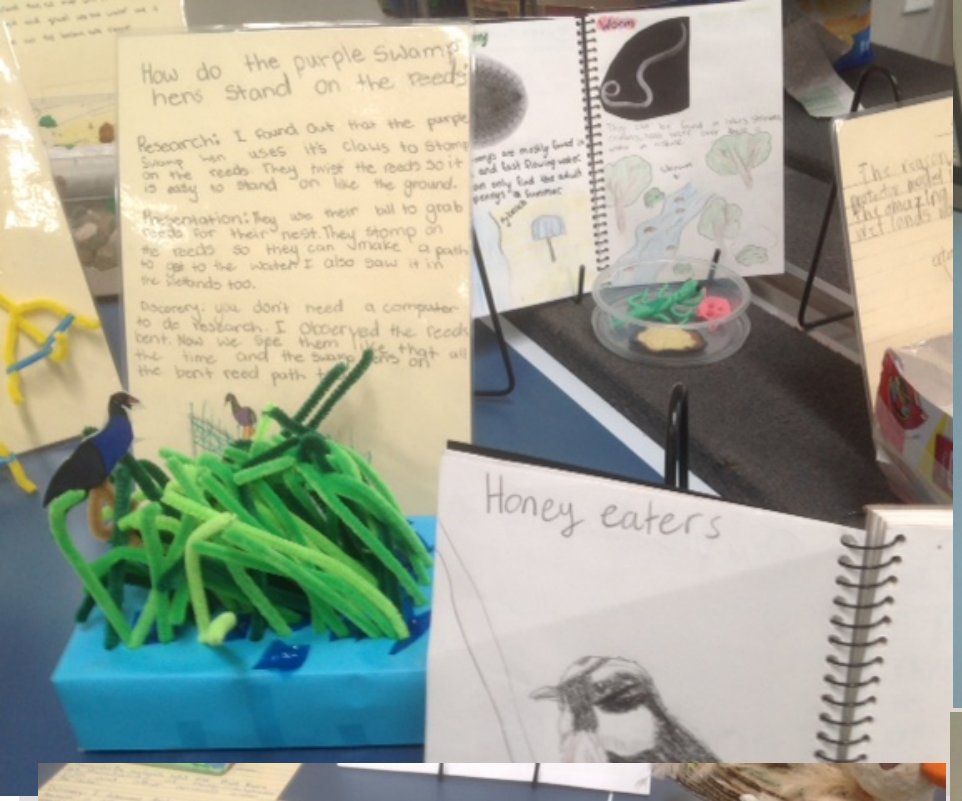
Environmental/ Historical	Understand Key moments in the lake's history Identify the environmental impacts to parts of the lake Have a focus point in photography	Start Bluebird History of Don Campbell Walk from Bluebird to Start of Outdoor Classroom Focus on Erosion damage Different soils Plants Rubbish	Recall dates of Don Campbell Recall stories of events Point out erosion and what causes erosion Identify to degree of erosion according to different types of soil Identify human impact Identify impact of weather Identify environmental controls, eg, fencing, grassed areas, planting by hy[illegible]	Bryce – Interest in erosion Theory put into practice - Erosion theories - native Vs introduced theories Created Strip Art with photos Were put on display for the community
Environmental	Test water quality Understand the impacts of human and environmental activity on water quality and vice versa Understand the different concerns and challenges facing the lake in regards to water quality	Learn theory of pH in Science Talk about turbidity Talk about salinity Test water for these three aspects Talk about phosphorous and nitrates Teacher tested water sample Discuss impacts and draw conclusions from tests	Participate safely in scientific inquiry Make predictions Draw conclusions and justify with evidence	Students noticed pipes going into the lake with water flowing from them Came up with possible origins and the impact of this on the lake's health. Discussed what stormwater is & the impacts on the lake Students identify how it was getting into lake Students could identify and discuss the current strategies used to manage stormwater
Cultural/ Recreational	Catch fish safely Make connections between families and community	Go to the lake with fishing rods Try to catch carp	Students attempt to catch fish	Bryce sat still for 20 minutes and refused to moved Was a very windy day and only one person got a bite Fathers, mothers, grandparents involved

Environmental/ Recreational	Manage a resource effectively Understand the effect of human impact on the environment (natural &built) Create a presentation about one aspect of Lake Bonney to teach to a small group of Children	Focus on Outdoor Classroom Identify existing infrastructure List positives and negatives Come up with a plan to manage/improve classroom	Make 'to do' lists Identify equipment needed Identify the purpose of the Outdoor Classroom	Every student was enthusiastic about taking ownership of Outdoor Classroom
Art with John Whitney	Express ourselves sing drawing Record our ideas using Art Use the surrounding environment to create art	Warm up art activities Artistic Technique Go to Outdoor classroom: Environmental Sculpture Aim to do fish printing (no fish caught) Point out indigenous fish traps on the beach	Attempt techniques Try something new Use natural materials to create a sculpture	Visited by the state water minister

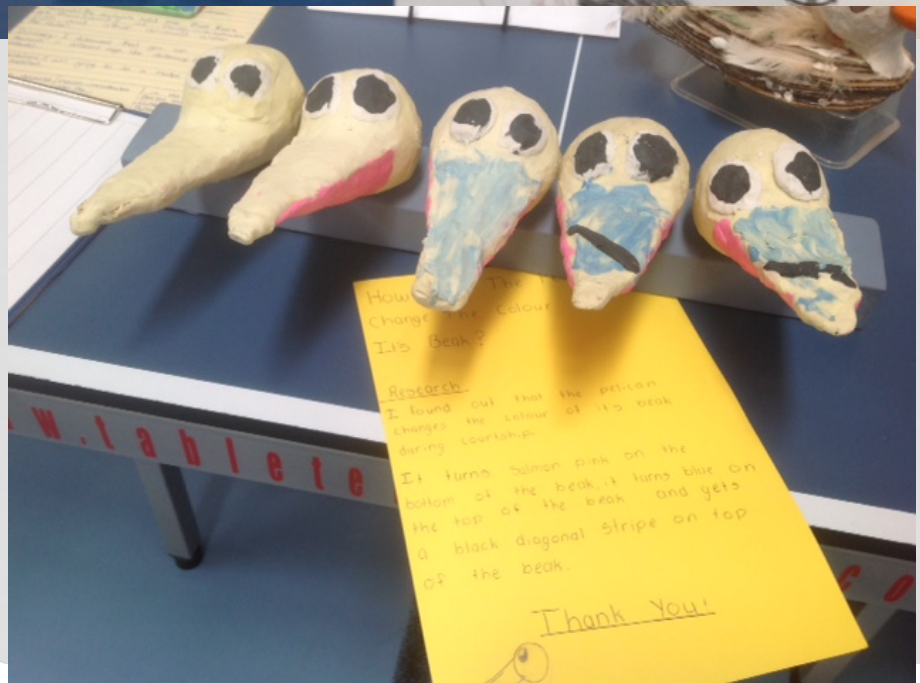
Rubbish Audit	Collect data for the council Take care of our resources Develop social responsibility	Use CUAD tools to collect rubbish at Outdoor Classroom Keep a tally of the type of rubbish found Discuss safe practices – take responsibility for keeping self safe	Tally is accurate Behaviours are safe Teacher Rubbish Collector is utilised for dangerous rubbish	Much undesirable rubbish was found. Council was contacted to solve this. They were very keen to help make the area safer. Students did well in identifying the risks with a public
Environmental Expo	Create a workshop to share information about a topic related to Lake Bonney.	Students choose a topic based around all the work we have done on Lake Bonney. Many students chose a topic related to their previous information report. Students were put into groups of at least 2. They created a workshop to run for 20 minutes. The audience was students from across the Riverland ranging from Year 1 through to Year 10.	Environmental Expo	This linked all of our work together nicely It gave students a purpose This demonstrated a depth of understanding which developed over the course of the unit. Students developed responsibility as they were in charge of a small group without direct teacher involvement.

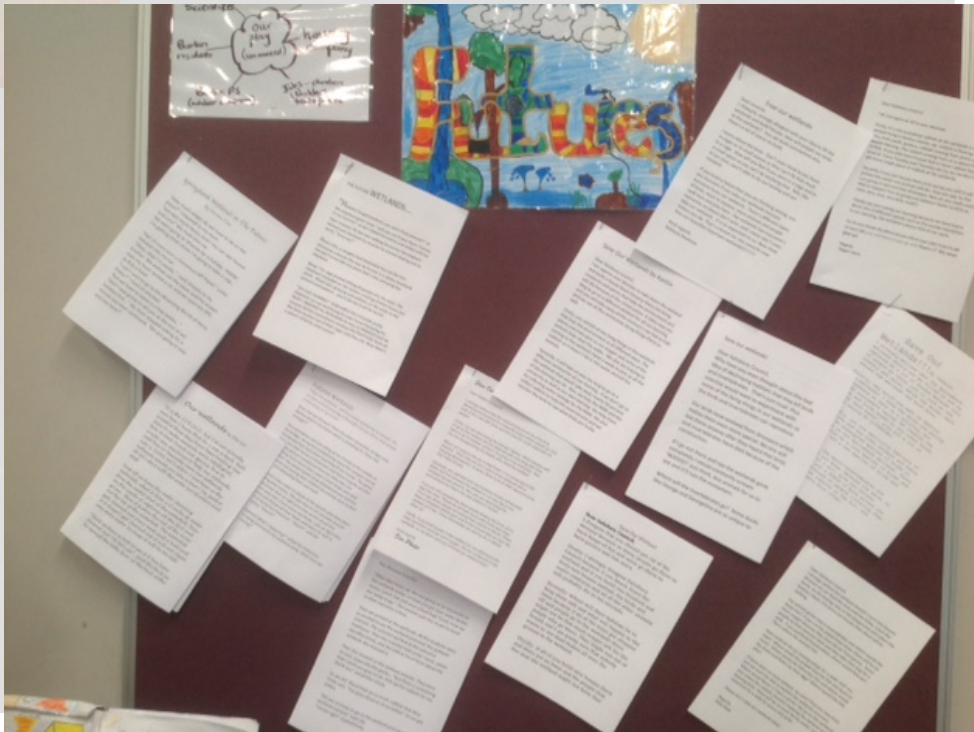

Wetlands
Expo
Date: Tuesd
7/11/17
Sausage Sizzle
Time: 5:30
Wetlands
Time: 6:30
Expo
Where: gym
Walking to the wetlands
Time: 7:00
Presentation of our learning
Time: 8:00

School Expo


How do the purple Swamp hens stand on the reeds
Research: I found out that the purple Swamp hen uses its claws to stamp on the reeds. They twist the reeds so it is easy to stand on like the ground.
Presentation: They use their bill to grab reeds for their nest. They stomp on the reeds so they can make a path to get to the water. I also saw it in the Wetlands too.
Discovery: you don't need a computer to do Research. I Observed the reeds bent. Now we see them like that all the time and the Swamp hens on the bent reed path
Honey eaters


Citizen Scientists
Exotic Birds


How does the Pelican change the colour of its beak?
Research
I found out that the pelican changes the colour of its beak during courtship.
It turns Salmon pink on the bottom of the beak it turns blue on the top of the beak and gets a black diagonal stripe on top of the beak.
Thank You!


Pictures

USING THE C WORD IN THE CLASSROOM

- **C**ontext – place-consciousness, driven by children
- **C**ontent knowledge – language/English across the curriculum, Indigenous knowledge, Science knowledge, proficiencies (children knowing and doing – working as scientists, as researchers, as mathematicians).
- **C**apabilities - cross-curricular
- **C**onnection – the affective, childrens' voices
- **C**ollective
- **C**ommunity
- Teacher as inquirer – support of leadership, more than one teacher

- Teacher's ability to teach this work – intellectual connection by teachers

	B1	B2	comment
Connection	Wetlands Family	Lake Community wanted to know more -people knew more New teacher who was connecting to place- engaging local community and people -fish hotels, Kids story book upstream- display in the main street	Sharing between schools- curiosity hour and cut up photography sharing invaluable Natural world Importance with arts/ creativity
Content	Whole curriculum Transdisciplinary teaching Subject and pulled in experts English, writing, futures, science Mathematics-data	History of lake, locks weir construction, flood, overflow, local community managing river Science water quality, plants, indigenous teacher aid. Maths- fibonacci sequence area History of lake Arts: environmental art, pelican picture	Connection to expert, Barmera got locals but hard getting experts valued John classroom Difference between simulation (erosion in sand pit) in classroom and at the lakes. Risk assessment. Picking up syringes
context	Classroom teacher and volunteer teacher Published author, experience, award Teaching science Cat 2 Local place wetlands visit get the magic	Team science NIT and classroom teacher neither permanent, Cat 2 Kids not connected to place – lake taken for granted. Read all history signs.	Team Early career Low SES cat schools Connection to place not just living in but connected and loving the place.
activism	Wrote to principal about no toilets close to the classroom. Wrote to council - …. Made signs about not feeding the ducks bread Entrepeurnal fed family with money from duck pellets	Wrote letters after Clean up Aust to council re syringes & rubbish Wrote letters to local MP about too much time at school and need more time with parents. Gofundme project about improving outdoor classroom in	Focused on project-authentic

COLLECTIVE

- Multiskilled experience mentoring inexperience.
- Being on same page nobody let anybody down
- Collaborative
- We all 'get it'
- Have consistent/common values about education.
- No one has agendas that they are not willing to compromise on.

- 5 teachers
- John WhitneyThe Arts
- Phil Roetman- urban ecology
- David Lloyd- Futures and community
- NRM education – Julian McMahon
- DECD – Katrina PhD students
- Sam for indigenous perspective, David C English/website Lisa – maths
- Barbara Comber- action research with teachers
- Margaret Summerville place consciousness
- Kathy Paige
- Sandra Goslin

WHERE TO FROM HERE

- Website development – collect student/teachers have produced/work samples artwork; writing; programs videos).

- Teacher Presentation to MASA/SASTA STEM

- Co writing articles

- ARC linkage

- Intergenerational education for adolescents towards unmissable futures

REFLECTIVE THOUGHTS

- Importance of curriculum connection to country/ community/elders/place
- Teacher as intellectual rather than teacher as technician Teachers as researchers and continuous learners
- An extended Transdisciplinary unit of work -indepth learning
- Face to face meetings- rural settings
- Early career teachers none of the 5 permanent research not valued across the sector
- Teacher change reinvigoration Transformative
- Stories of hope Ripple of learning, students, teachers, academics, higher degree
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